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# The Epiphytic Diatom Flora of Two Sargassum Species

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# SHORT COMMUNICATIONS

## THE EPIPHYTIC DIATOM FLORA OF TWO *SARGASSUM* SPECIES

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*ABSTRACT* The epiphytic diatom flora on the brown algae *Sargassum natans* (L.) J. Meyer and *S. fluitans* Børgesen were investigated and compared. A total of 50 taxa representing 21 genera were identified. The most abundant taxa were *Amphora exigua* Greg., *A. coffeiformis* (Ag.) Kütz., *Synedra fasciculata* (Ag.) Kütz., *Cocconeis pseudodiruptoides* Foged, and *Navicula ramosissima* (Ag.) Cleve. Comparisons of the dominant species and diversity statistics characterizing the two samples indicated the two brown algal species supported nearly identical epiphytic diatom floras.

### INTRODUCTION

Most of the recent studies of Gulf Coast benthic diatoms have involved sediment-associated floras and pertinent examples include Wood (1963), Sullivan (1978), Cook and Whipple (1982), and Stowe (1982). Although epiphytic diatoms on seagrasses in the Gulf of Mexico have been studied (Montgomery 1978, Sullivan 1979), there has been only one investigation of diatoms epiphytic on attached seaweeds from the Gulf Coast (Medlin 1983). The studies of Grunow (1867) (Honduras), Hentschel (1921) (Sargasso Sea), and Carpenter (1970) (western Sargasso Sea) are the only reports of diatoms epiphytic on *Sargassum* species. The purpose of this report is to describe and compare the epiphytic diatom floras on *Sargassum natans* (L.) J. Meyer and *S. fluitans* Børgesen.

*Sargassum natans* and *S. fluitans* are the two most common species of *Sargassum* found in the Gulf of Mexico, and both species range throughout the Gulf, in particular coastal areas where drifting plants wash ashore. Unlike most species of *Sargassum, S. fluitans* and *S. natans* are obligate drifters with *S. natans* often comprising 95% of the mass of floating communities (Conger et al. 1972).

### MATERIALS AND METHODS

Samples of *S. natans* and *S. fluitans* were collected with a hand net from a single station in the Gulf of Mexico (longitude 29°31′N and latitude 93°31′W) approximately 22 km southwest of Calcasieu Pass, Louisiana, on 25 June 1982. Composite samples of each host (including 2 cm of stipe, 4–5 pneumatocysts, and 2 or 3 blades) were boiled in $HNO_3$ with $K_2Cr_2O_7$ to oxidize all organic matter. A portion of each sample was mounted in Hyrax for identification and counting with an Olympus BHTU microscope. A sample from each host plant consisted of exactly 500 valves from five counts of 100 valves where each count was made from a separate slide prepared from the composite sample. After each sample had been analyzed taxonomically, the two floras were compared using Stander's (1970) Similarity Index (SIMI) and the Shannon-Weiner Information Index (Pielou 1975).

### RESULTS AND DISCUSSION

A total of 50 taxa representing 21 genera were identified in the two samples. Forty-three taxa were collected from *S. fluitans* and 39 from *S. natans*. The identity and relative abundance of each diatom taxon is listed in Table 1. The dominant genera, in terms of taxa encountered, were *Mastogloia* (8), *Navicula* (7), *Amphora* (4), and *Nitzschia* (4). The five most abundant taxa of the pooled sample, in order of decreasing abundance, were as follows: *Amphora exigua, A. coffeiformis, Synedra fasciculata, Cocconeis pseudodiruptoides,* and *Navicula ramosissima.* The first four taxa were also the four most abundant diatoms on both *S. natans* and *S. fluitans.* These five accounted for 65% of the 1,000 valves counted. Additional scans of the slides revealed several taxa not included in the counts. These taxa were: *Achnanthes hauckinana* Grun., *Cymbella pusilla* Grun., *Eunotogramma laeve* Grun., *Navicula comoides* (Ag.) Perag., *Nitzschia frustulum* (Kütz.) Grun., *N. microcephala* Grun., and *N. palea* (Kütz.) Grun.

Of the 50 taxa identified, 6 taxa are new records for the north-central Gulf: *Amphora bigibba, Cocconeis pseudodiruptoides, Licmophora remulus, Mastogloia ovalis, M. pusilla* var. *subcapitata,* and *Synedra provincialis* var. *tortuosa.* All of the taxa except *C. pseudodiruptoides* and *M. pusilla* var. *subcapitata* have been previously reported from the greater Gulf of Mexico (Conger et al. 1972; Sullivan 1981, Maples 1983a and 1983b). *Cocconeis pseudodiruptoides* was described by Foged (1975) as a littoral species along the Tanzania Coast. The chief difference between this species and *C. diruptoides* Hust. is the presence of a dilated central area which reaches the margin of both

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TABLE 1

**Relative abundance (expressed as number of valves in a sample of 500) of epiphytic diatom taxa on *Sargassum fluitans* and *S. natans* from the coastal marine waters of southwestern Louisiana. Collected on 25 June 1982. ΣN = both samples pooled as one.**

| Diatom taxon | *Sargassum* | | |
|---|---|---|---|
| | *fluitans* | *natans* | ΣN |
| *Achnanthes biasolettiana* (Kütz.) Grun. | 15 | 10 | 25 |
| *A. brevipes* var. *intermedia* (Kütz.) Cl. | 1 | – | 1 |
| *Amphora angusta* var. *ventricosa* Greg. | 4 | 6 | 10 |
| *A. bigibba* Grun. | 4 | – | 4 |
| *A. coffeiformis* (Ag.) Kütz. | 114 | 84 | 198 |
| *A. exigua* Greg. | 103 | 98 | 210 |
| *Bacillaria paxillifer* (Müll.) Hendey | 4 | 1 | 5 |
| *Cocconeis pseudodiruptoides* Foged | 36 | 60 | 96 |
| *C. scutellum* Ehr. | 8 | 10 | 18 |
| *Coscinodiscus radiatus* Ehr. | 1 | 1 | 2 |
| *Cyclotella atomus* Hust. | 20 | 4 | 24 |
| *C. striata* (Kütz.) Grun. | 4 | 6 | 10 |
| *C. meneghiniana* Kütz. | 1 | – | 1 |
| *Diploneis weissflogi* (A.S.) Cl. | 2 | – | 2 |
| *Fragilaria construens* var. *venter* (Ehr.) Grun. | 2 | 1 | 3 |
| *Grammatophora oceanica* Ehr. | 1 | 1 | 2 |
| *Licomphora abbreviata* Ag. | 8 | 16 | 24 |
| *L.* cf. *debilis* (Kütz.) Grun. | 4 | 4 | 8 |
| *L. remulus* Grun. | 2 | 2 | 4 |
| *Mastogloia acutiuscula* Grun. | 1 | 2 | 3 |
| *M. binotata* (Grun.) Cl. | 4 | 3 | 7 |
| *M. crucicula* (Grun.) Cl. | 8 | 6 | 14 |
| *M. erythraea* Grun. | – | 10 | 10 |
| *M. exigua* Lewis | – | 18 | 18 |
| *M. ovalis* A.S. | 2 | – | 2 |
| *M. pusilla* Grun. | 4 | 32 | 36 |
| *M. pusilla* var. *subcapitata* Hust. | 6 | 4 | 10 |
| *Navicula ramosissima* (Ag.) Cl. | 36 | 14 | 50 |
| *N. amphipleuroides* Hust. | 4 | – | 4 |
| *N. abunda* Hust. | 8 | 8 | 16 |
| *N. incomposita* var. *minor* Hagelstein | – | 3 | 3 |
| *N. tripunctata* var. *schizonemoides* (V.H.) Patr. | 1 | 2 | 3 |
| *Navicula* sp. #1 | 2 | 2 | 4 |
| *Navicula* sp. #2 | 1 | 2 | 3 |
| *Nitzchia bicapitata* Cleve | 1 | 1 | 2 |
| *N. dissipata* (Kütz.) Grun. | 4 | – | 4 |
| *N. fasciculata* (Grun.) Grun. | – | 2 | 2 |
| *N. gandersheimiensis* Krasske | 6 | 1 | 7 |
| *Pleurosigma normanii* Ralf. | 4 | – | 4 |
| *P. salinarum* (Grun.) Grun. | 1 | – | 1 |
| *Psammodiscus nitidus* (Greg.) Round & Mann | 3 | – | 3 |
| *Rhopalodia gibberula* (Ehr.) Müll. | 4 | 2 | 6 |
| *R. operculata* var. *producta* Grun. | – | 1 | 1 |
| *Synedra fasciculata* (Ag.) Kütz. | 48 | 58 | 106 |
| *S. provincialis* var. *tortuosa* Grun. | 4 | 6 | 10 |
| *Striatella unipunctata* (Lyngb.) Ag. | 10 | 10 | 20 |
| *Thalassionema nitzschioides* (Grun.) V.H. | – | 1 | 1 |
| *Thalassiosira eccentrica* (Ehr.) Cl. | 1 | – | 1 |
| *T. leptopus* (Grun.) Hasle & Fryxell | – | 1 | 1 |
| *Trachysphenia acuminata* Perag. | 2 | 1 | 3 |
| H′ | 2.796 | 2.755 | —— |
| S | 43 | 39 | 50 |

the raphe and rapheless valves in the former. It is interesting to note that the illustrations of *C. dirupta* Greg. reported on *Sargassum* by Carpenter (1970) are identical to *C. pseudodiruptoides*. Apparently this record of *C. pseudodiruptoides* is new for the United States, which is interesting since it constituted nearly 10% of the epiphytic diatom flora in the pooled *Sargassum* samples.

A comparison of the epiphytic diatom flora on the two *Sargassum* species revealed few differences. The species diversities ($H' \log_2$) for each of the *Sargassum* samples were almost identical (Table 1). A comparison of the structural similarity (SIMI) of the two samples revealed a value of 0.931. SIMI has the limits of 0 and 1; the larger the SIMI value, the greater the similarity between two samples. A total of 32 taxa were recorded as common to both *Sargassum* species (Table 1). Of the 18 taxa found only on one of the *Sargassum* species, all but 2 of these taxa (*Mastogloia erythraea* and *M. exigua*) were represented by 4 valves or less. This data, along with very similar values of H′ and S for the two samples (Table 1) and a high SIMI value, indicates the two brown algal species supported nearly identical epiphytic diatom floras.

A comparison was made of the results from this study with others on the epiphytic diatom flora of *Sargassum*. Grunow (1867) recorded 91 species from the coastal waters of Honduras and only 7 of these were encountered in the present study. None of the species found to be common to both studies was abundant in the present study. Since Hentschel (1921) recorded only one taxon (*Cocconeis* sp.), no meaningful comparison can be made. Carpenter (1970) identified only 10 taxa to species from samples collected in the western Sargasso Sea, only 5 are common to the present study. Although Carpenter (1970) collected the same species of *Sargassum* as examined in the present study, the dominant taxa were quite different. *Mastogloia binotata* was the dominant taxon in 6 of his 7 samples, but constituted less than 1 percent of the total valves in the pooled samples of the present study. It is interesting to compare the low number of epiphytic diatom taxa (10) reported by Carpenter (1970) on open-ocean *Sargassum* as opposed to the much higher numbers found on coastal *Sargassum*, 91 by Grunow (1867) and 50 in the present study. The differences between these studies may be related to unknown physiochemical differences among the habitats and the small number of samples investigated.

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